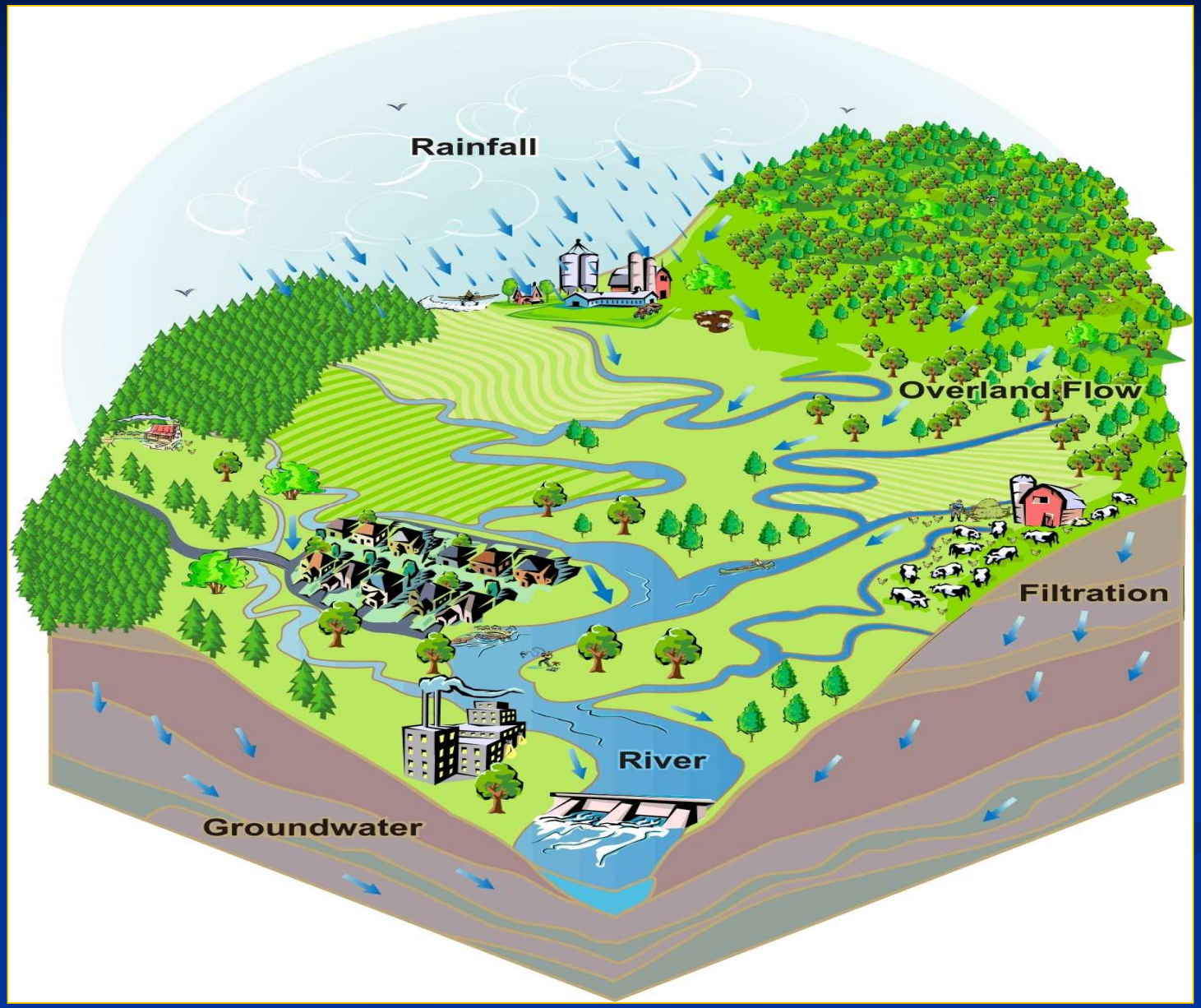
A WATERSHED VIEW



UNDERSTANDING WATERSHEDS

- 1st Law of hydrology: “Water runs downhill”
- Understand how watersheds are defined
- Impacted by natural phenomena and human activities
- Importance of a watershed view
- Mapping your watershed

UNDERSTANDING WATERSHEDS

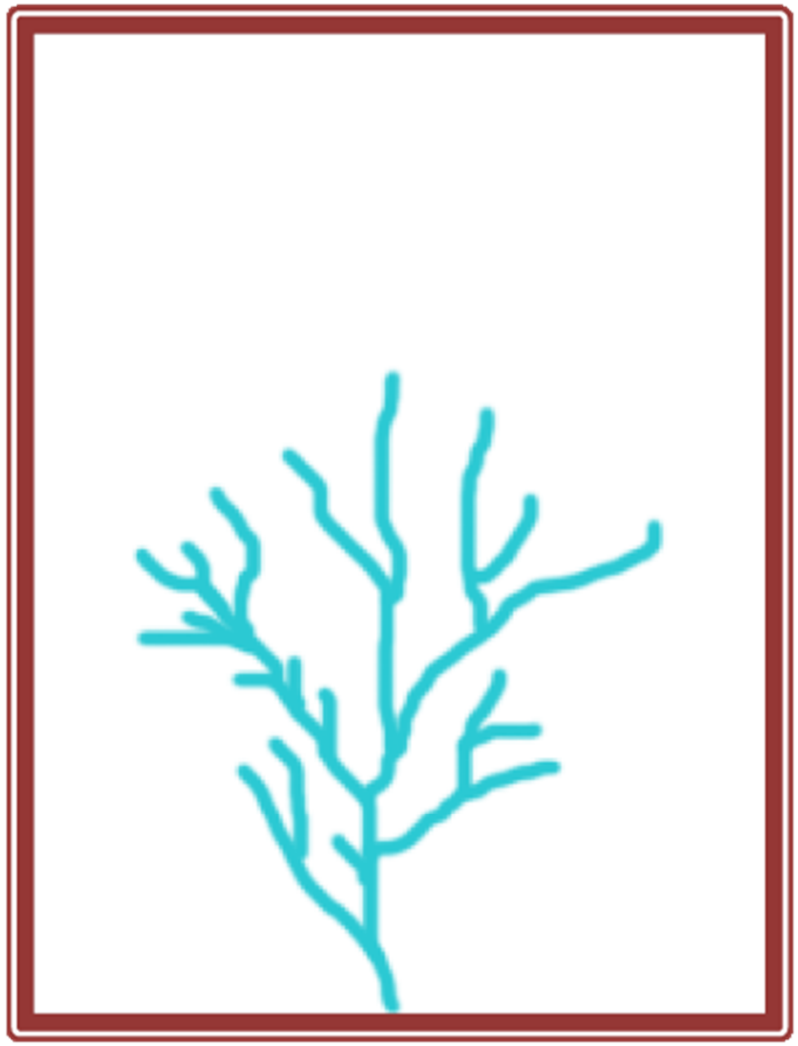
- Essential to the interpretation of stream health and water quality
- Everything that occurs within a watershed affects water resources
- Stream health depends on a healthy watershed.

WATERSHED MAPPING BENEFITS

- Identify potential sources of pollution
- Identify monitoring sites
- Provide information to educate
- Provide a sense of value
- To make informed decisions

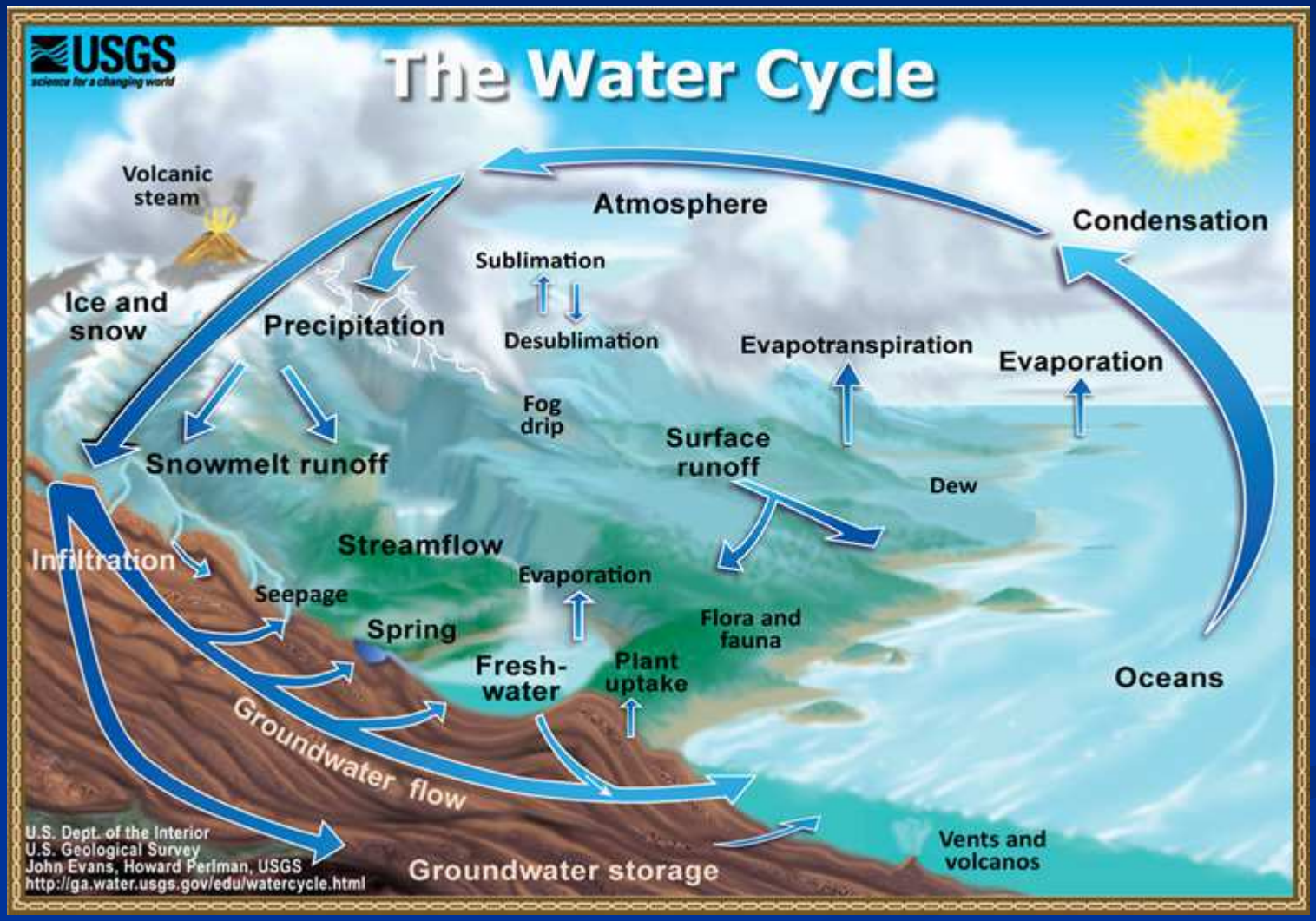
WHAT IS A WATERSHED?

- A topographically-defined area of land that drains into a particular body of water
  - Drainage basin
  - Catchment area



Initiation

HYDROLOGY


USGS
science for a changing world
The Water Cycle
Volcanic steam
Atmosphere
Condensation
Sublimation
Ice and snow
Precipitation
Desublimation
Evapotranspiration
Evaporation
Fog drip
Surface runoff
Snowmelt runoff
Dew
Streamflow
Infiltration
Evaporation
Seepage
Flora and fauna
Spring
Fresh-water
Plant uptake
Oceans
Groundwater flow
U.S. Dept. of the Interior
U.S. Geological Survey
John Evans, Howard Perlman, USGS
http://ga.water.usgs.gov/edu/watercycle.html
Groundwater storage
Vents and volcanos

VARIABLES CONTROLLING WATERSHED CHARACTERISTICS

- Climate
- Hydrology
- Geology
- Soil types
- Slope/gradient/topography
- Land use/land cover

CLIMATE AFFECTS…

- Erosion and deposition and how they form the landscape
- Types of soil and vegetation present
- Climactic conditions influence the movement of water and sediment

WATERSHED GEOLOGY

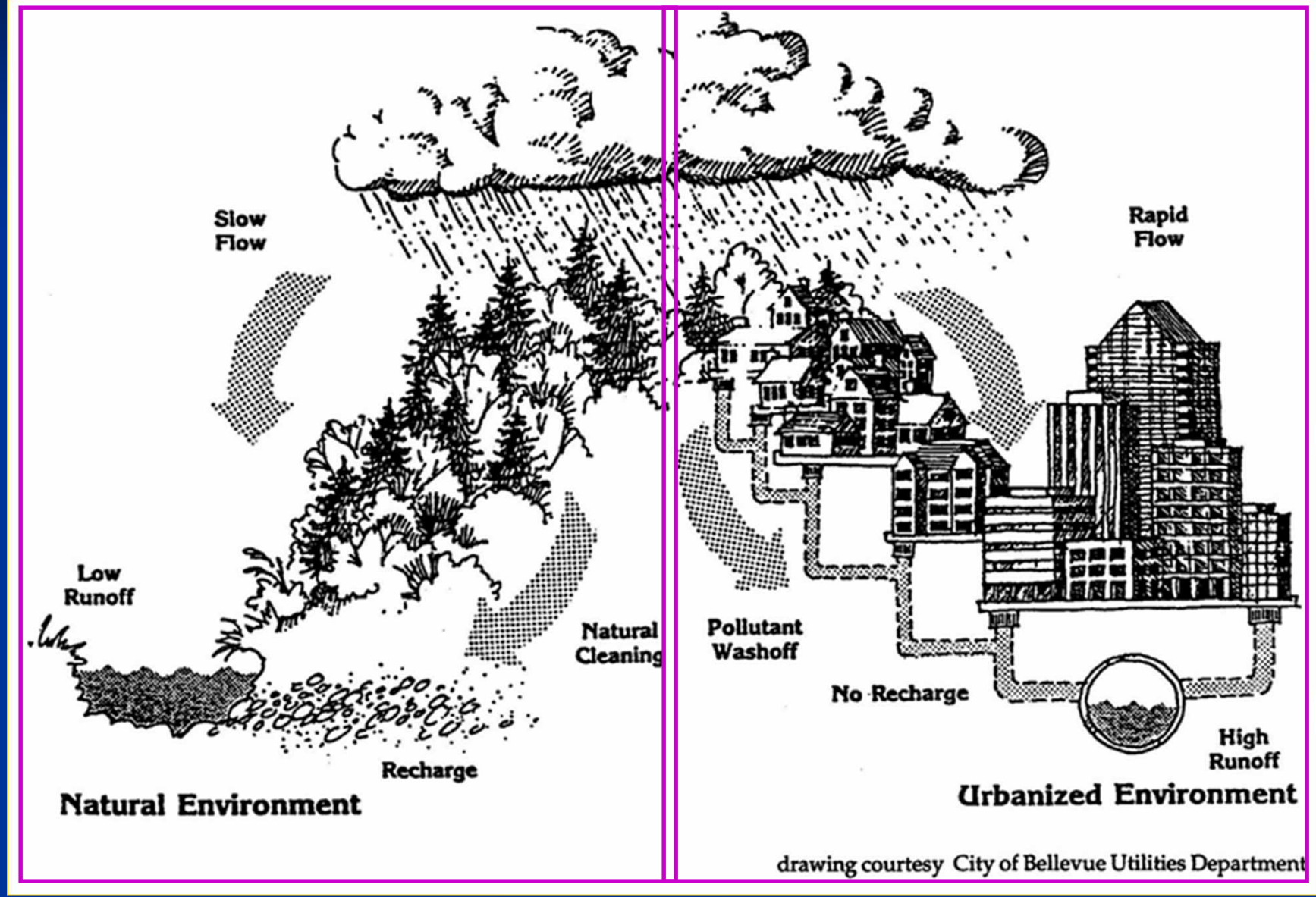
The rocks and sediments that underlie the watershed determine:

- Groundwater storage
- Materials present to form soil types
- Material available for erosion and transport
- Chemical quality of water

LAND USE/LAND COVER

- Disturbed areas without vegetation suffer from increased runoff and erosion
- Impervious surfaces
- Undisturbed areas, wetlands, uncompacted soils, and vegetation absorb water and slow runoff

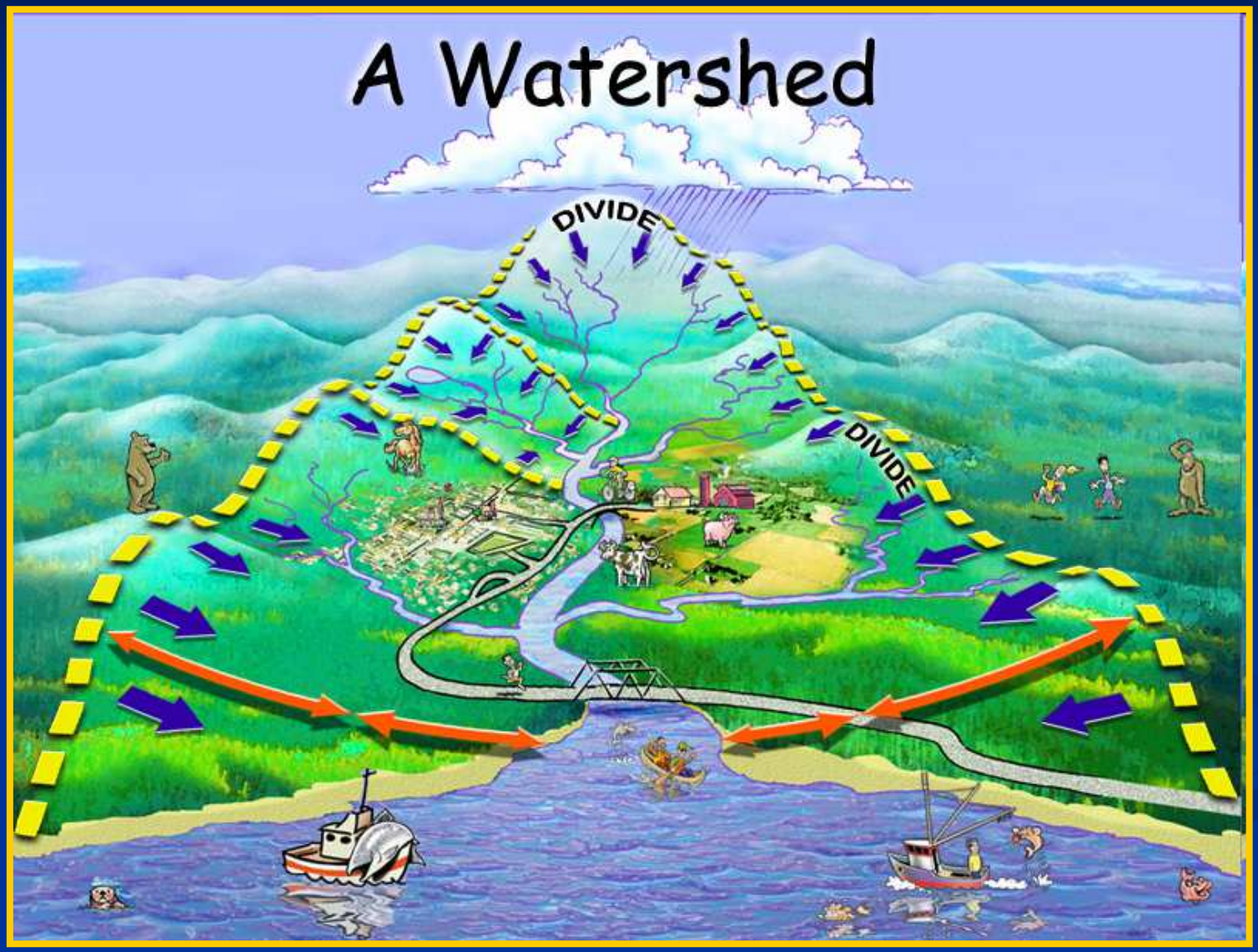
HUMAN USES OF LAND AND WATER IMPACT WATER QUALITY



WATERSHED DYNAMICS

- All parts of a watershed are interconnected
- Most pervasive threat to water quality is siltation due to runoff and soil erosion
- Land use, slope, and soil type influence runoff and erosion
- Activities in upper reaches of watershed affect water quality down stream

WATERSHEDS ARE INTERCONNECTED WATER SYSTEMS



Parts of a watershed:

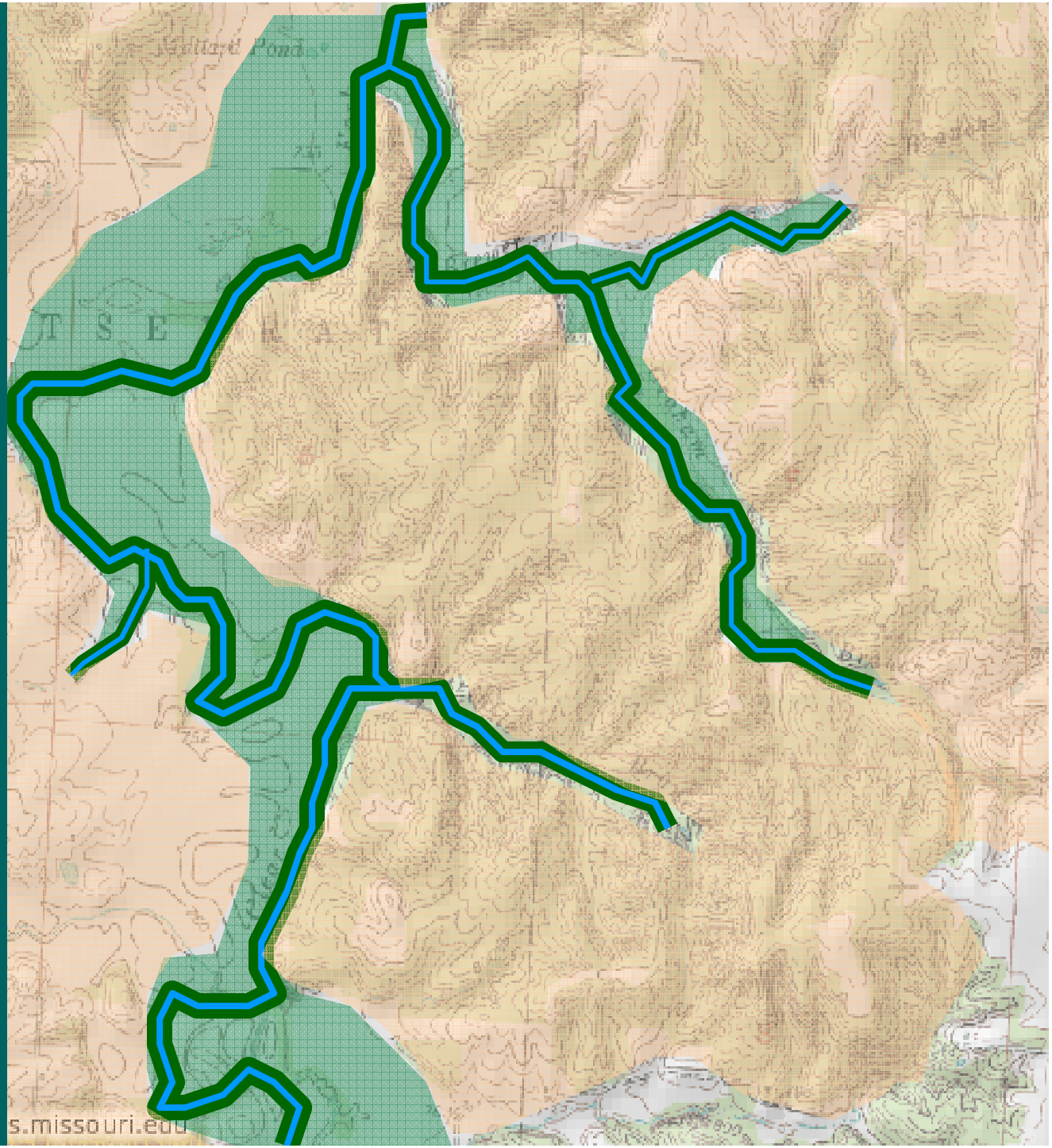
Uplands
- infiltration and run-off
- slope
- sediment and nutrients
- filtration

Floodplains
- water storage
- dissipate velocities
- sediment drop
- channel adjustment zone

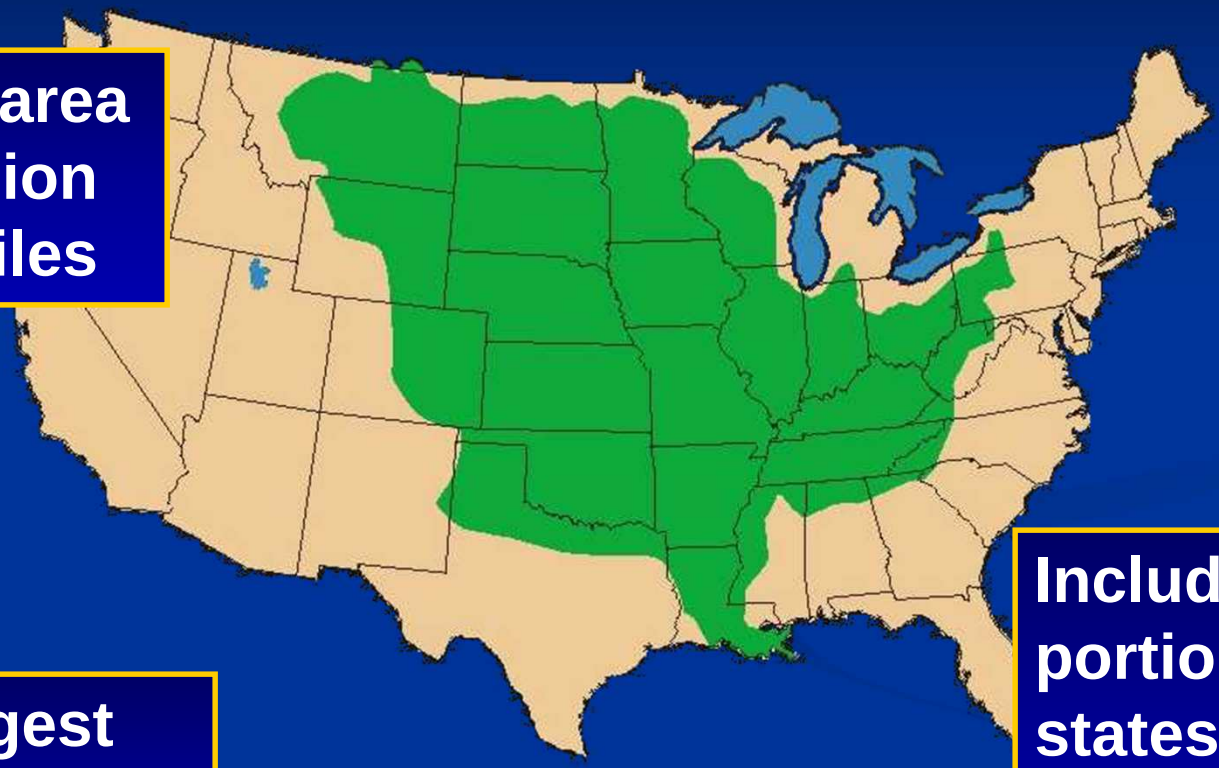
Riparian Corridor
- regulate temperatures
- reduce velocities
- stabilize banks
- organic input
- filter / traps debris
- habitat structure

Stream Channel
- water and sediment transport

Groundwater
- provides base flow



MISSISSIPPI RIVER WATERSHED

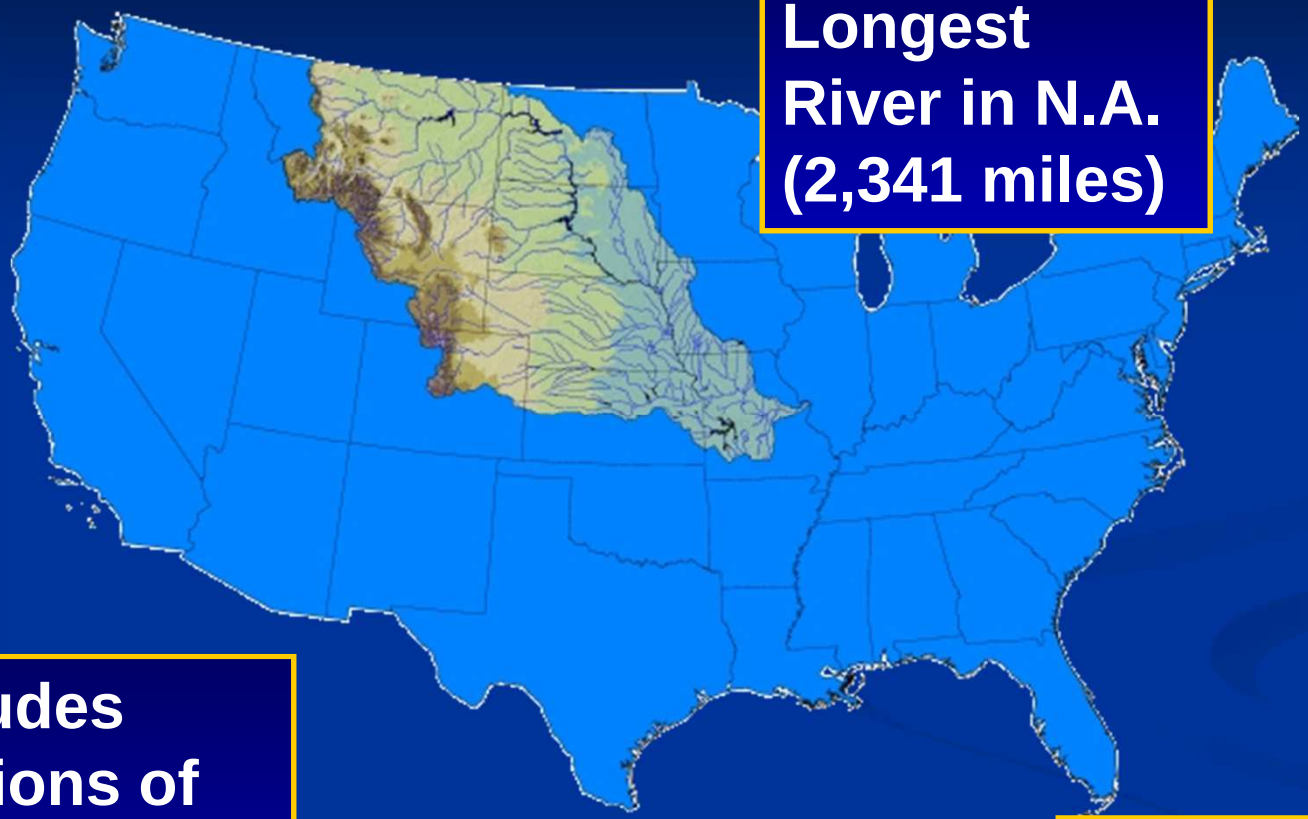


Drainage area of 1.2 million square miles

3rd largest watershed in the world

Includes portions of 30 states and a small part of Canada

MISSOURI RIVER WATERSHED

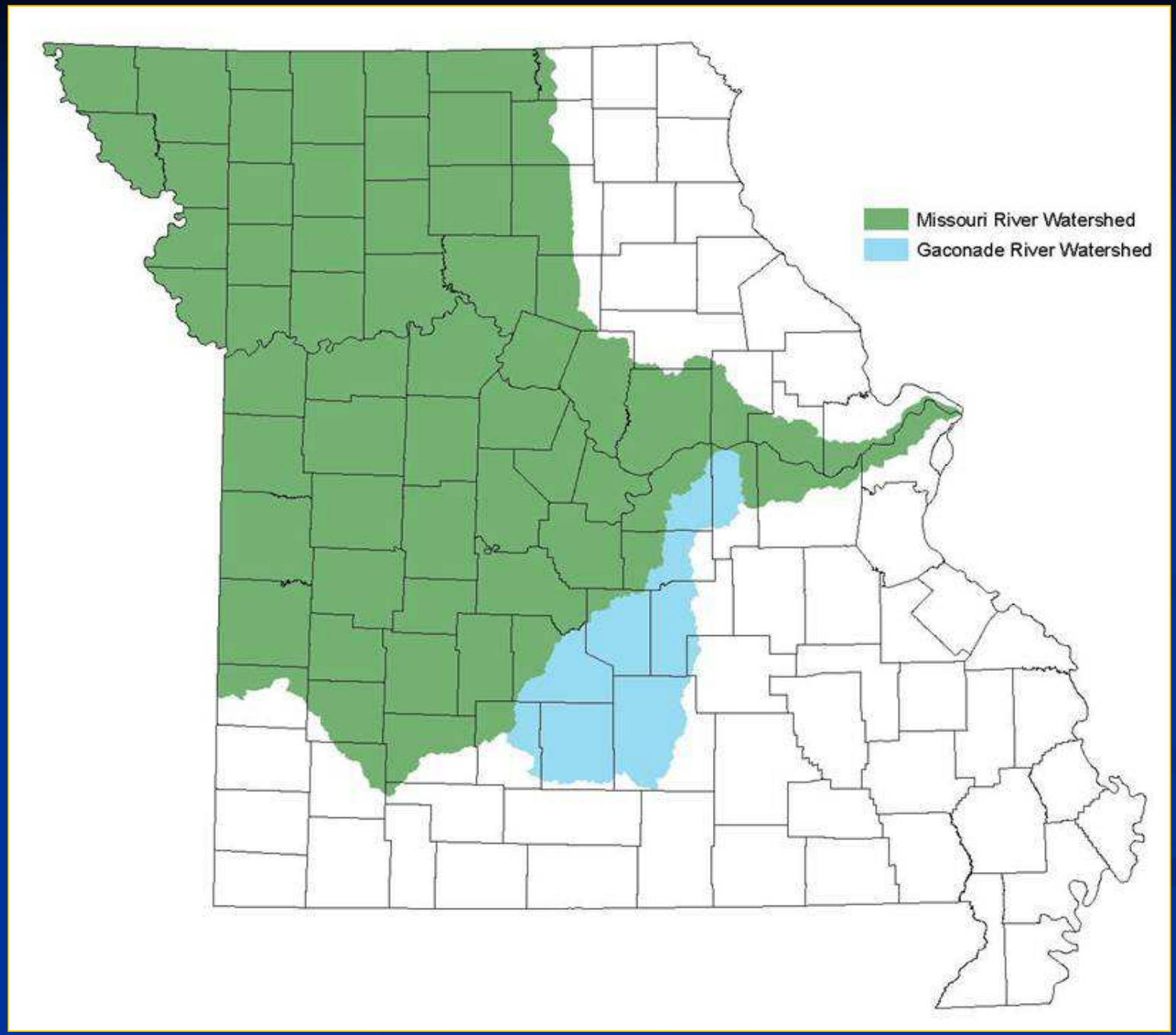


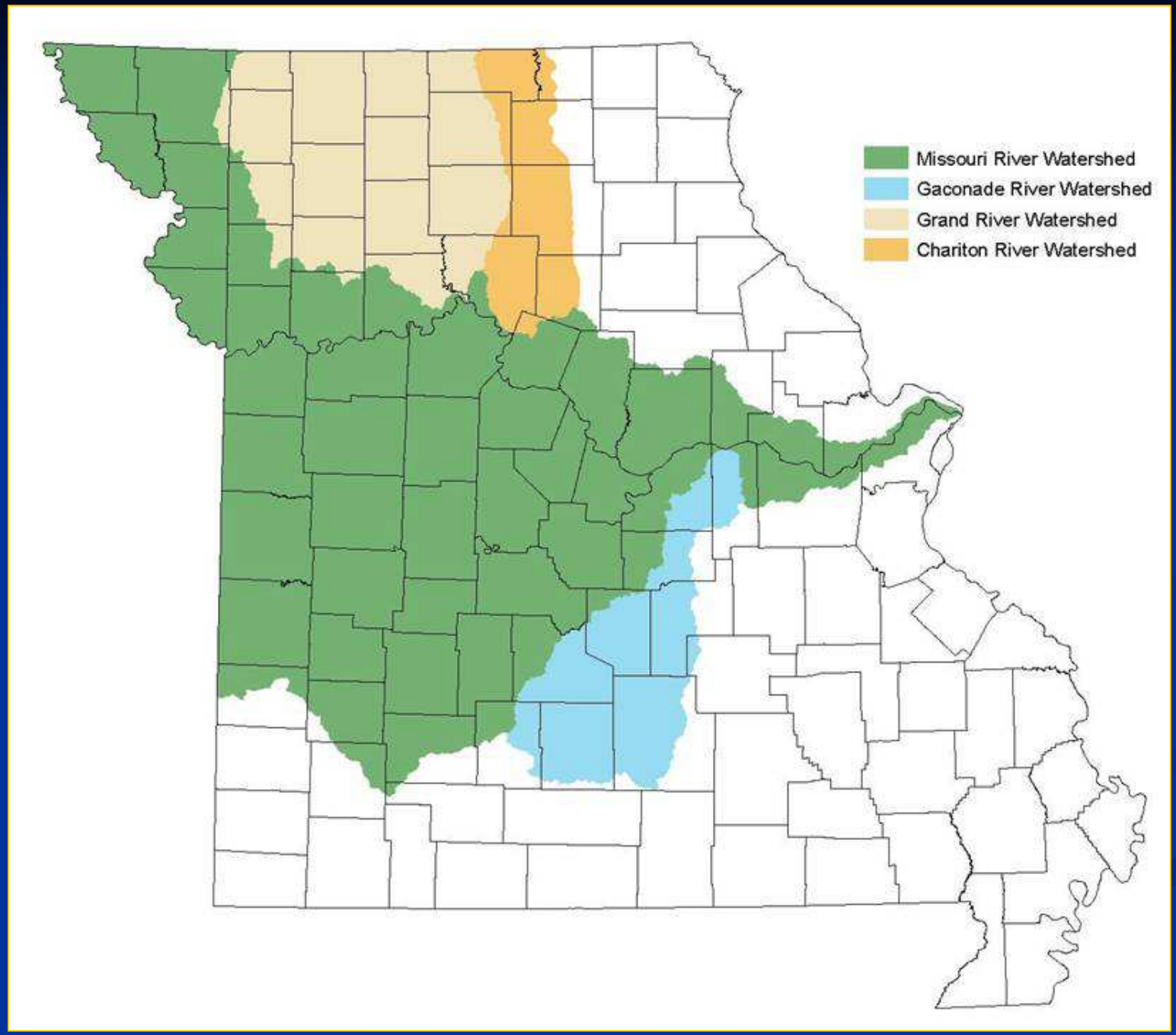
Longest River in N.A. (2,341 miles)

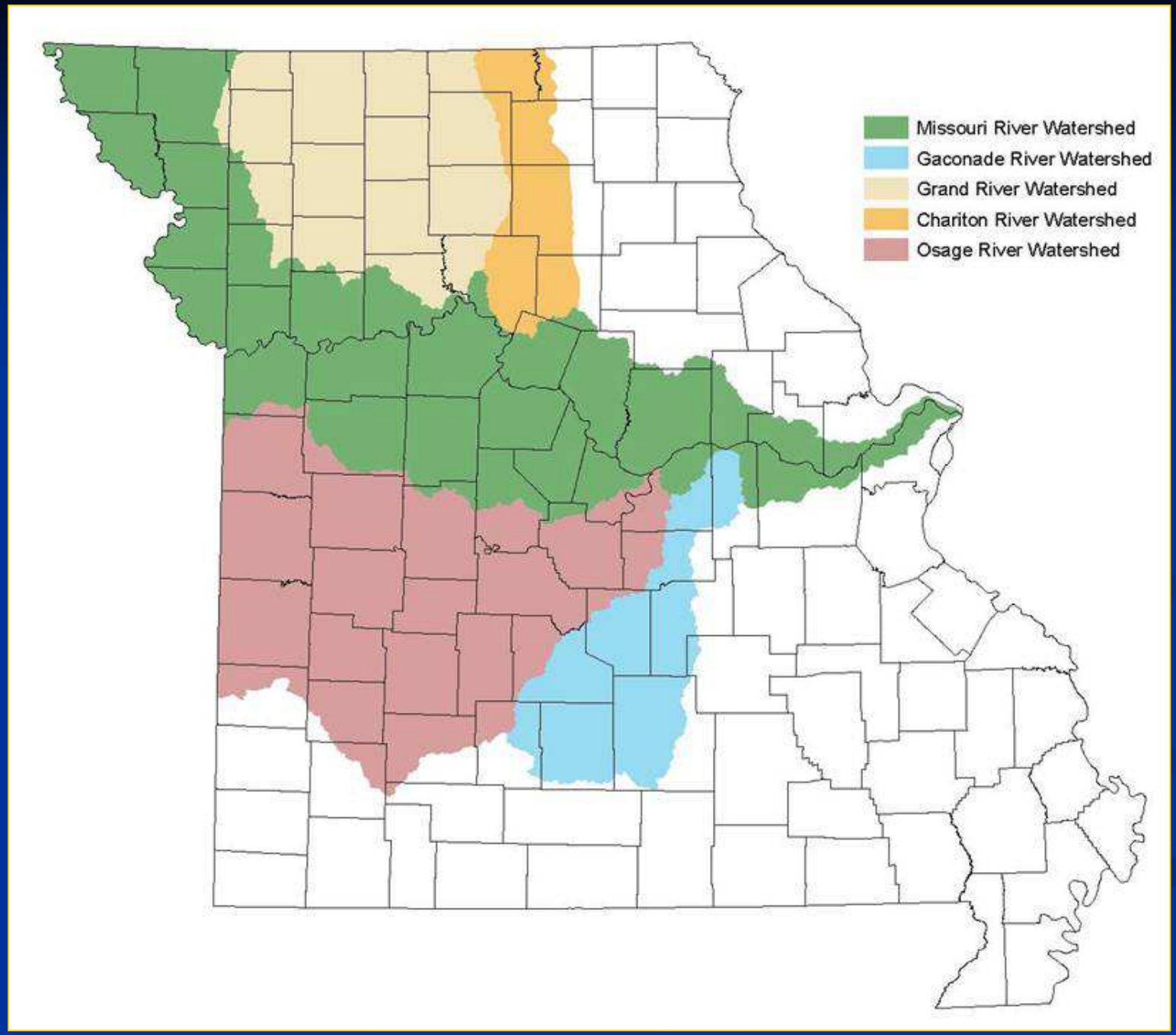
Includes portions of 10 states and a small part of Canada

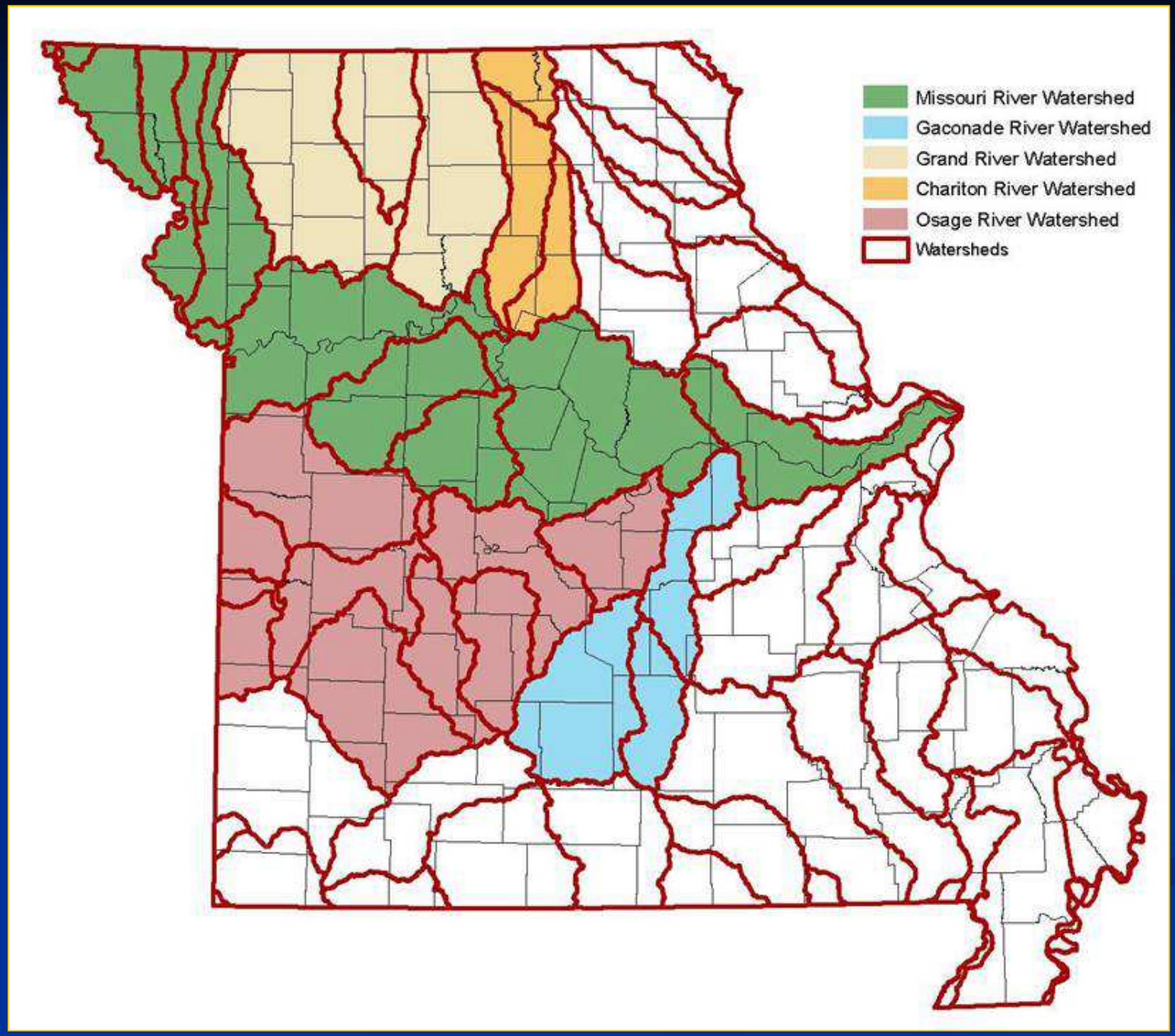
Drainage area of 529,350 square miles (1/6 of U.S.)

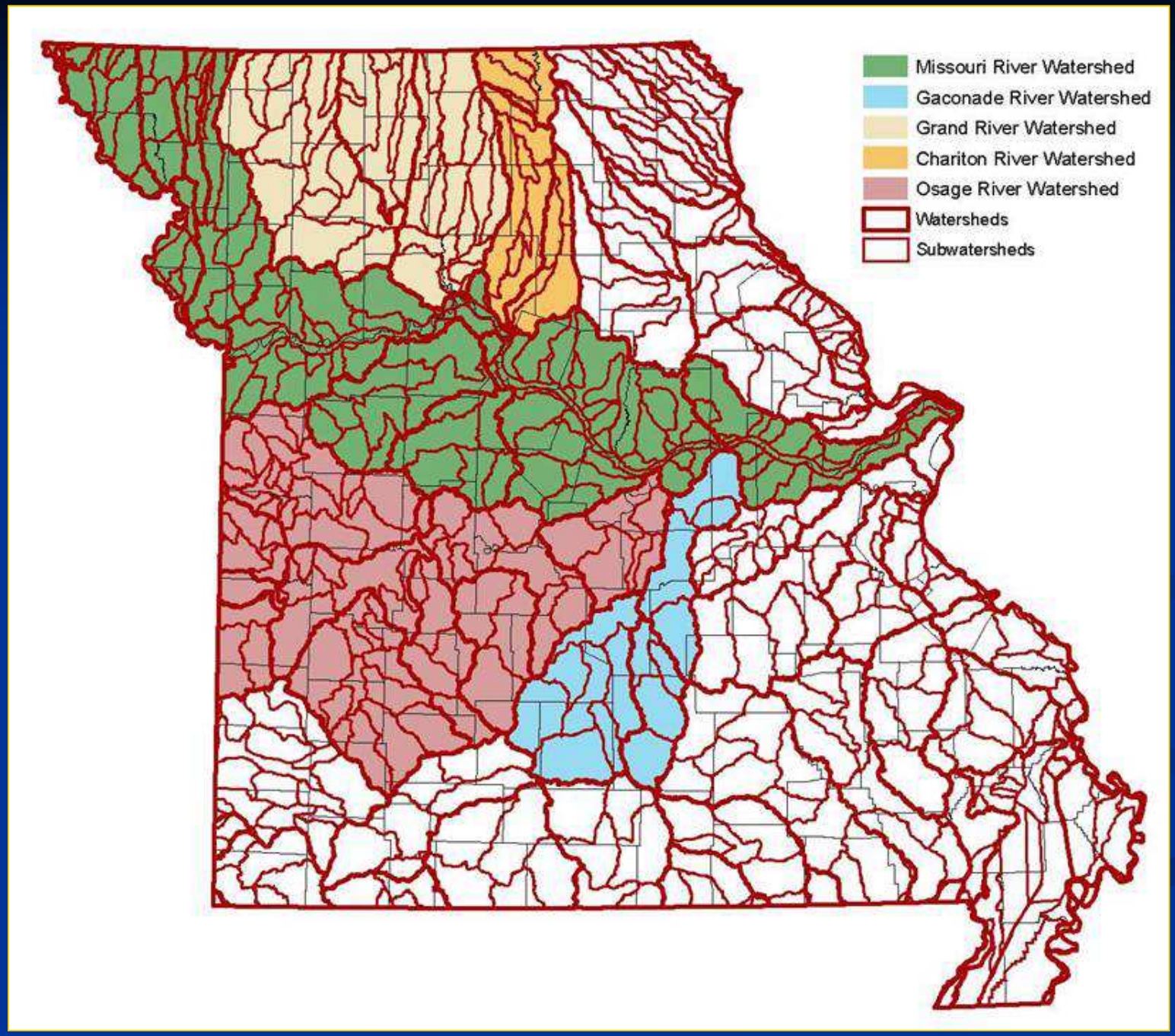

Missouri River Watershed

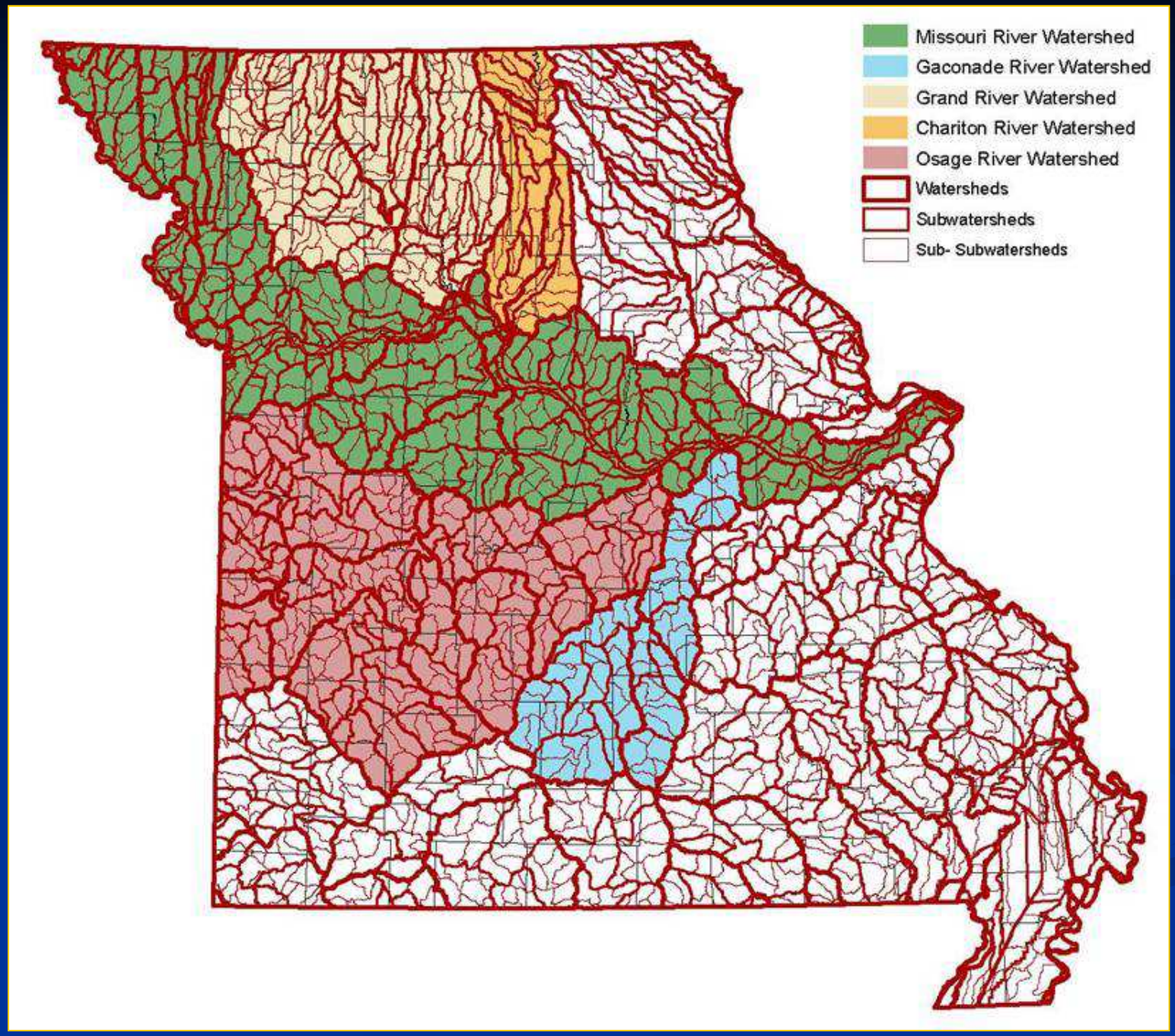

Missouri River Watershed
Gaconade River Watershed


Missouri River Watershed
Gaconade River Watershed
Grand River Watershed
Chariton River Watershed


Missouri River Watershed
Gaconade River Watershed
Grand River Watershed
Chariton River Watershed
Osage River Watershed

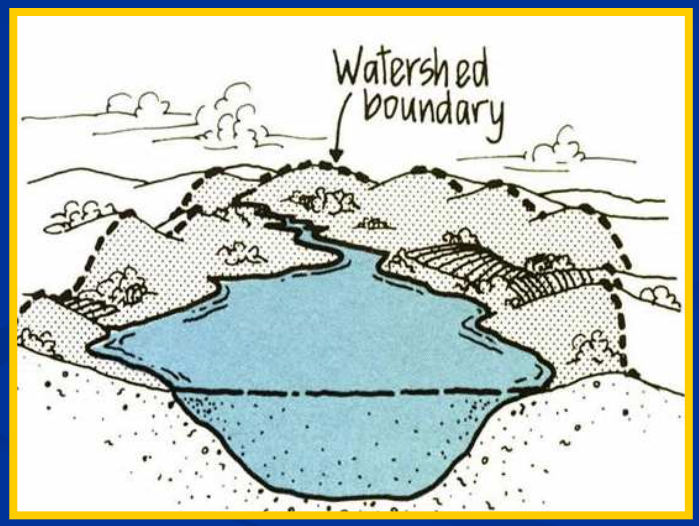

Missouri River Watershed
Gaconade River Watershed
Grand River Watershed
Chariton River Watershed
Osage River Watershed
Watersheds


Missouri River Watershed
Gaconade River Watershed
Grand River Watershed
Chariton River Watershed
Osage River Watershed
Watersheds
Subwatersheds

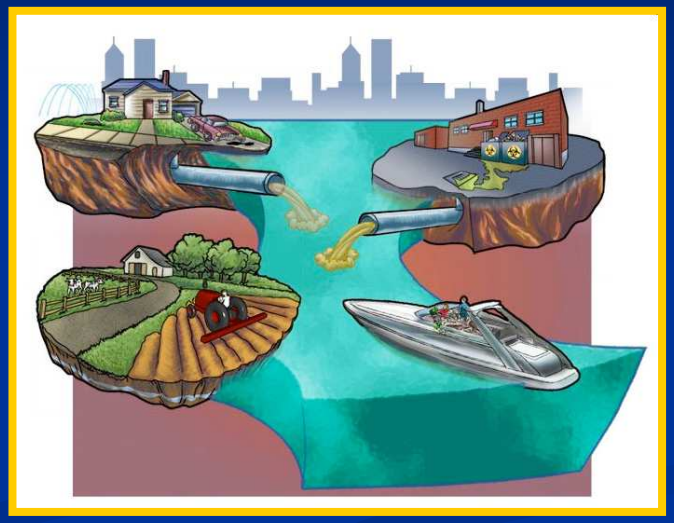

Missouri River Watershed
Gaconade River Watershed
Grand River Watershed
Chariton River Watershed
Osage River Watershed
Watersheds
Subwatersheds
Sub- Subwatersheds

YOUR WATERSHED

- Choose a manageable size
- Know your watershed boundaries as defined by topography
- Land use



TYPES OF POLLUTANTS



Point source pollution

- Such as a pipe discharge
- Requires a permit

Nonpoint source pollution

- From a number of diffuse sources
- Harder to identify so more difficult to control

NONPOINT SOURCE POLLUTION

Agricultural Sources

- soil erosion
- animal waste
- fertilizer
- pesticides

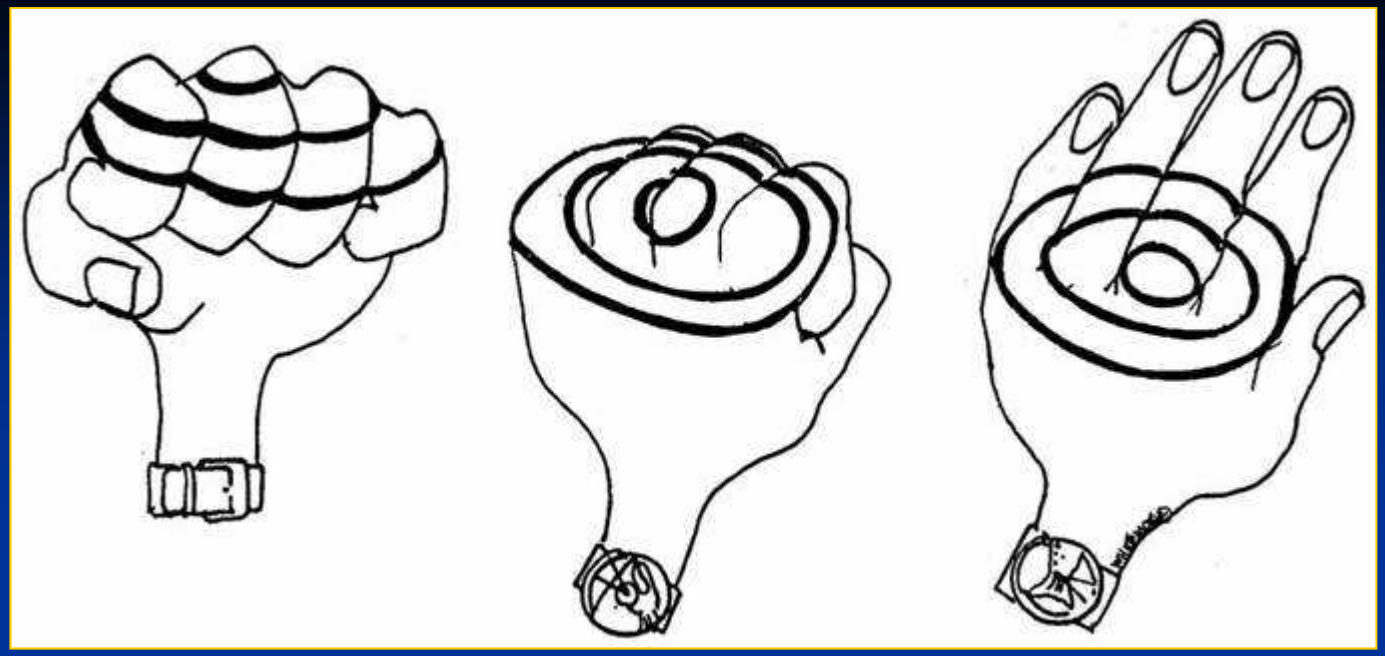
NONPOINT SOURCE POLLUTION

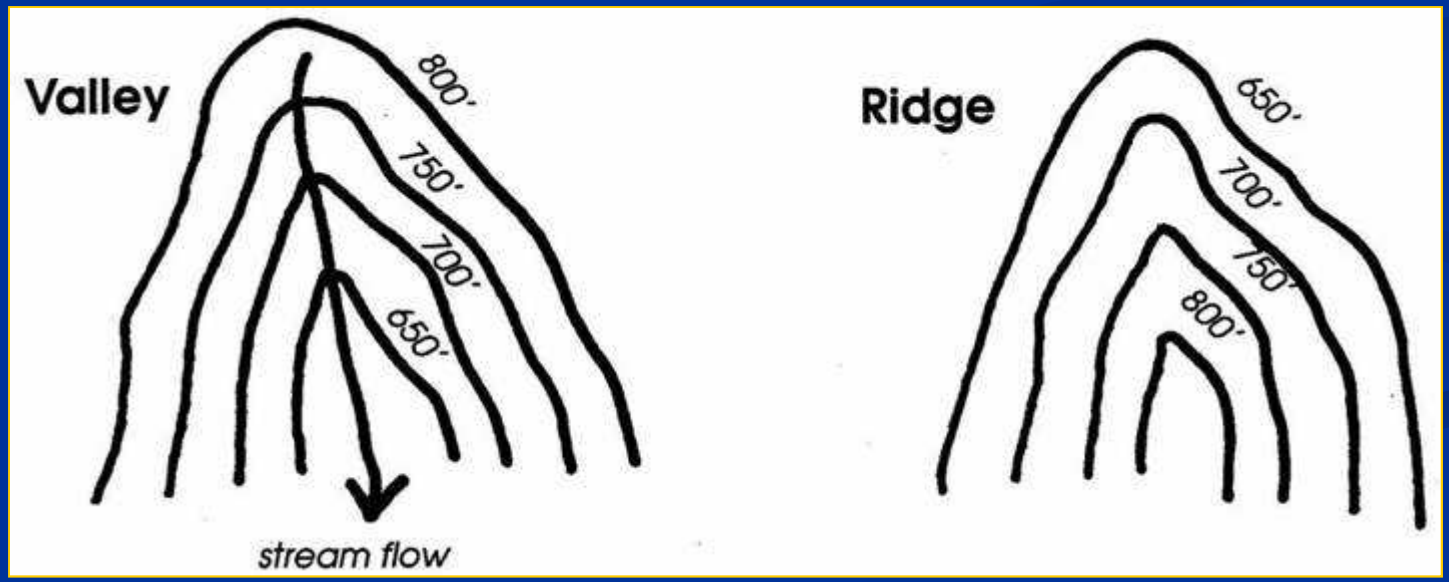
Urban Sources

- runoff from impervious surfaces
- fertilizers & pesticides from lawns, parks, golf courses
- sediment from construction sites
- cleaning products
- pet waste

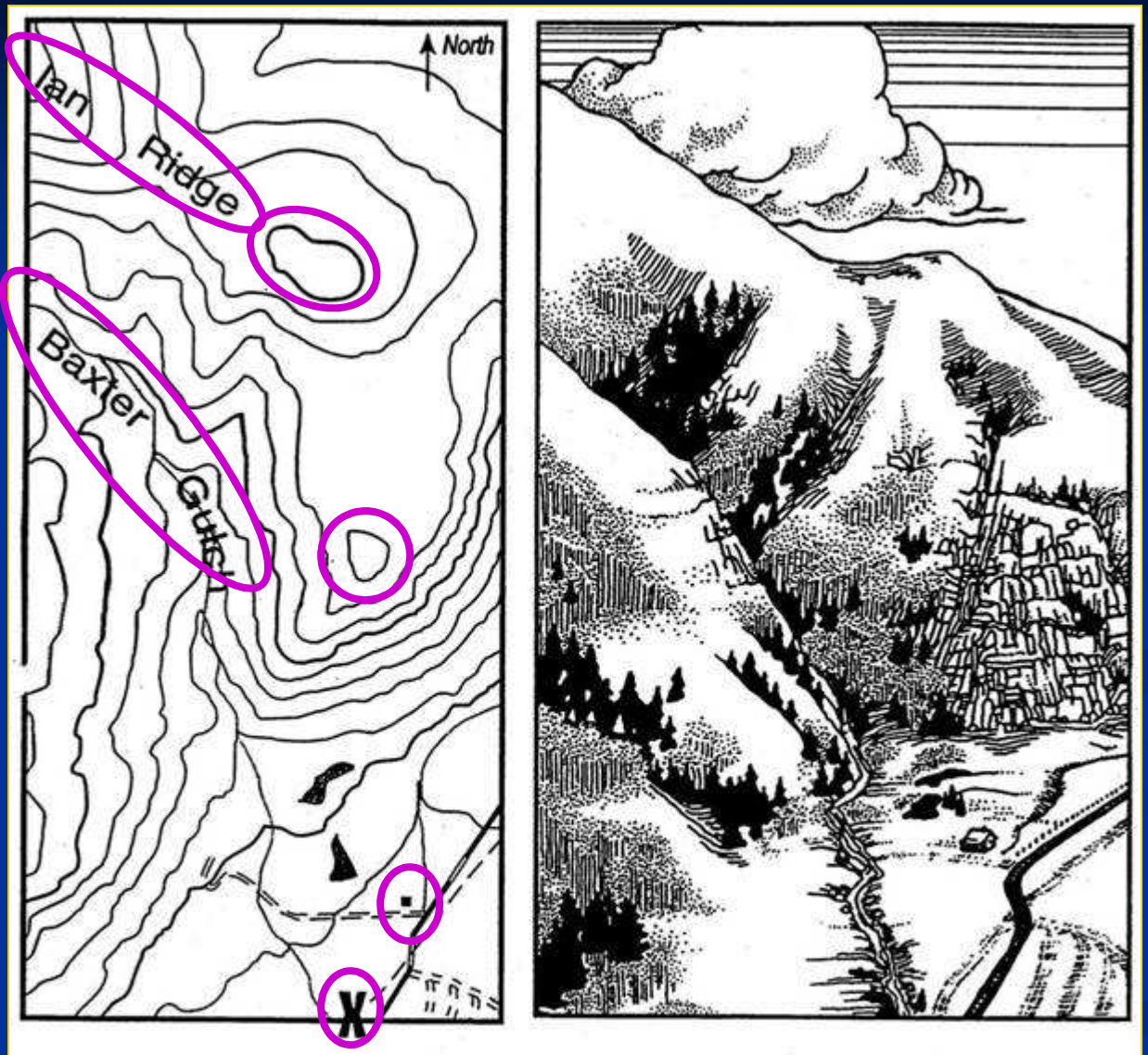
TOPOGRAPHIC MAPS

- Represent a four-sided region called a quadrangle
- Use *contour lines* to illustrate relief
- *Symbols* show boundaries, surface features, buildings, roads, railroads, and communication features
- *Scale* represents distance




Valley
800'
750'
700'
650'
stream flow
Ridge
650'
700'
750'
800'

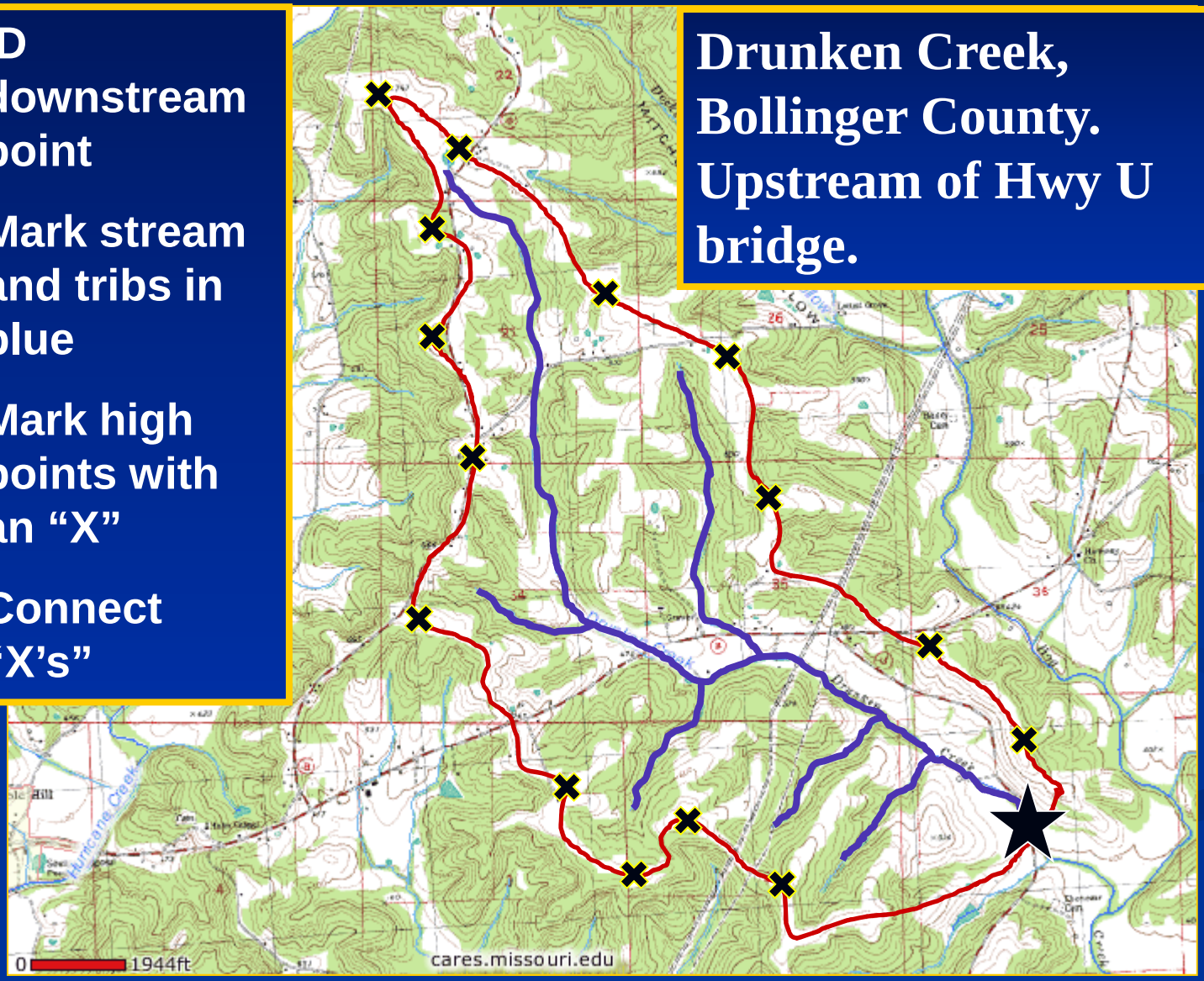
TRANSLATING THE TOPO MAP TO REAL LIFE



Standing at the "X" on the topo map (above left), someone looking north would see the scene depicted above, right, including the secondary highway, streams, house, unfinished roads, ponds, and mountain ridges.

Drunken Creek Watershed

1) ID downstream point
2) Mark stream and tribs in blue
3) Mark high points with an “X”
4) Connect “X’s”

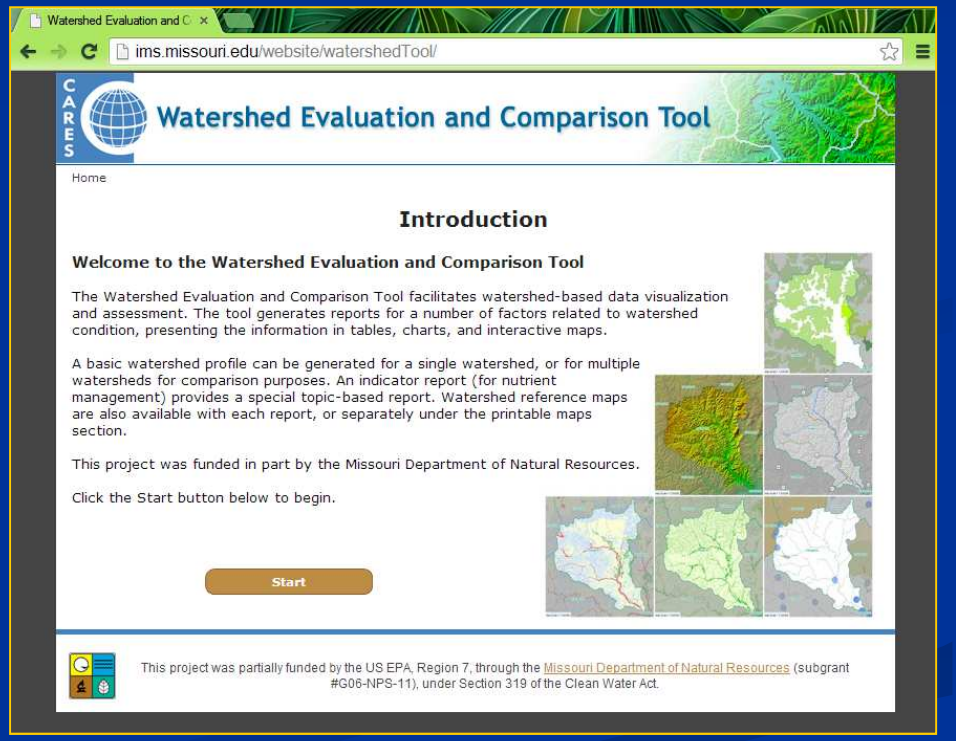


Drunken Creek, Bollinger County. Upstream of Hwy U bridge.

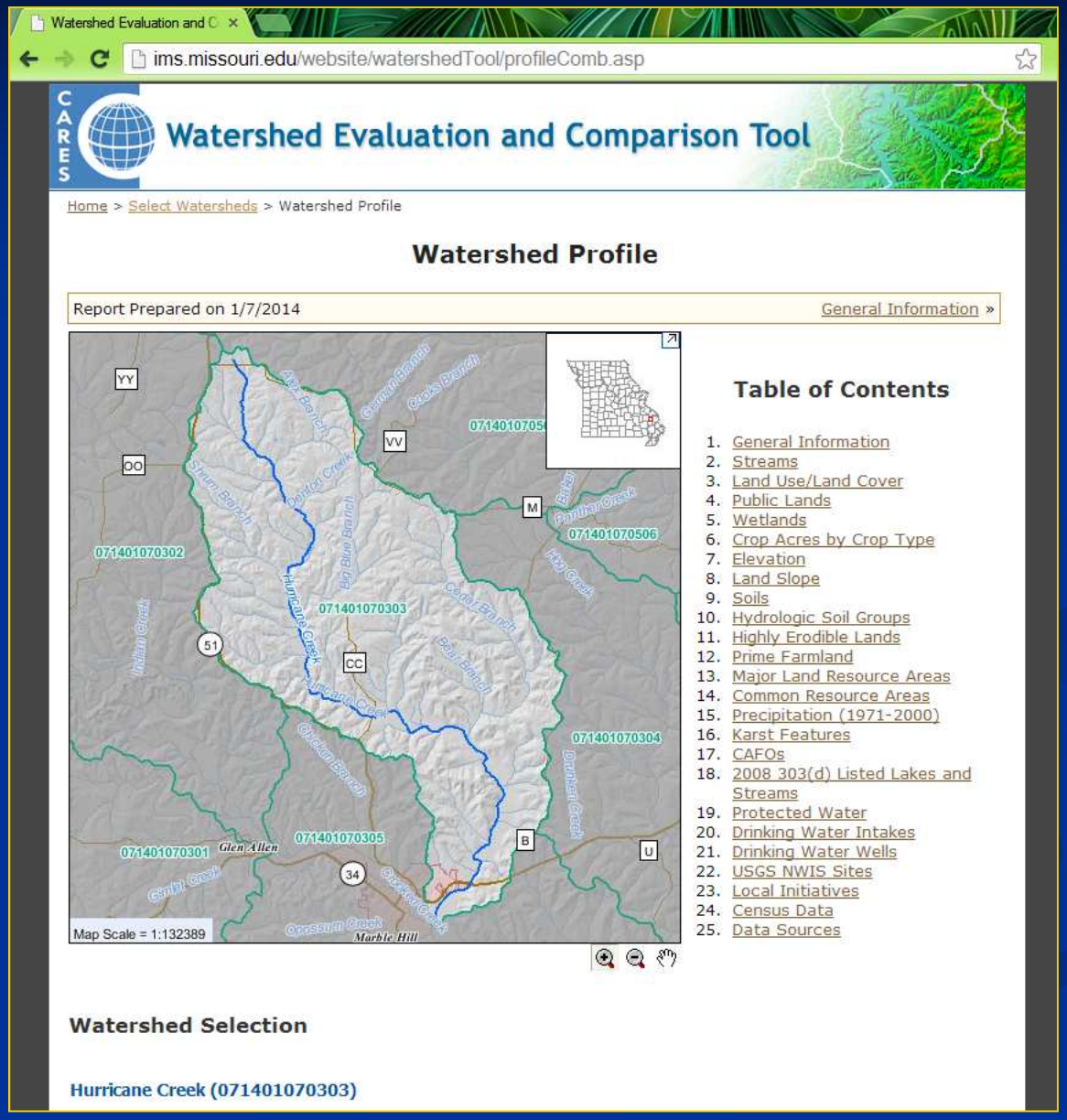
Online Watershed Mapping

- CARES Map Room
  - http://cares.missouri.edu
  - Click Map Room
- Three options for mapping your watershed:
  - Missouri Interactive Maps
  - Missouri Watershed Tool
  - Atlas Maps

Watershed Evaluation and Comparison Tool



Watershed Evaluation and



STREAM TEAM INVENTORY GUIDE

INVENTORY YOUR ADOPTED STREAM AND . . .

LEARN ABOUT YOUR STREAM'S HEALTH

IDENTIFY PROBLEMS THAT MAY NEED WORK

UNDERSTAND MORE ABOUT STREAMS IN GENERAL

MISSOURI STREAM TEAM

♦ EDUCATION ♦ STEWARDSHIP ♦ ADVOCACY ♦